

Gains in novice teacher effectiveness: On-the-job development or less effective teachers leaving?

In this policy brief, we show that some of the apparent gains in effectiveness of novice teachers in North Carolina are due to less effective teachers leaving, but the majority of the gains are due to teachers becoming more effective while on the job. The evidence suggests that:

1. *Novice teachers have the capacity to quickly become more effective in the classroom;*
2. *Policies and practices can enhance teachers' effectiveness more rapidly, such as more teaching experiences in schools prior to beginning as novice teachers, meaningful mentoring, and comprehensive induction programs focused on improving classroom teaching could increase student performance.*

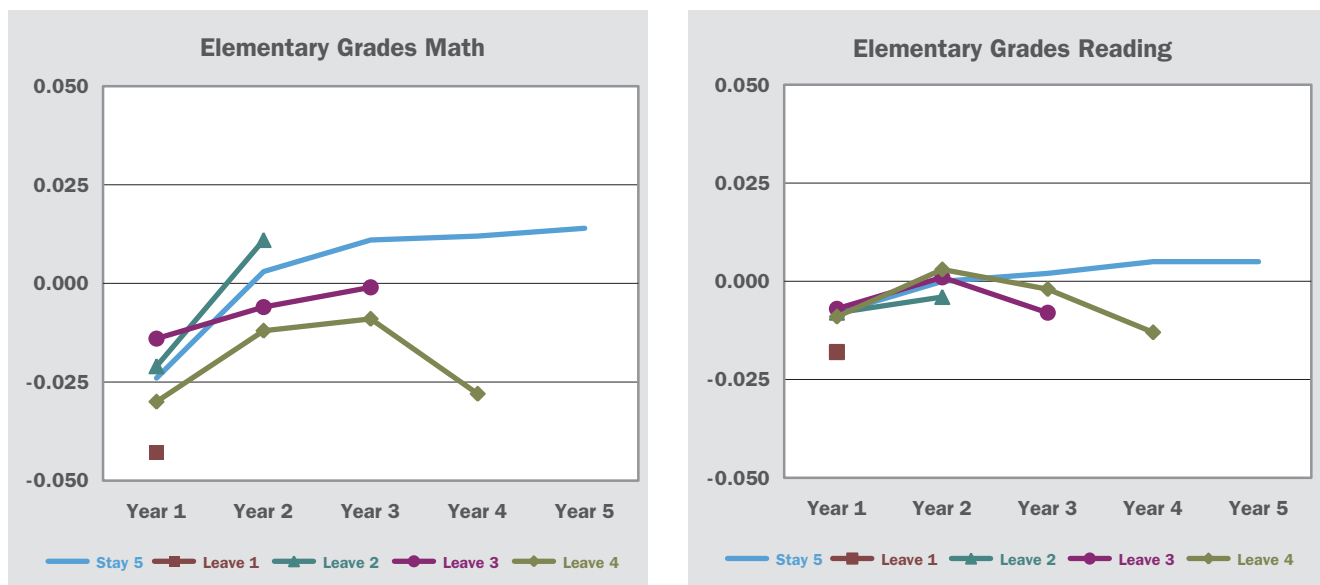
Introduction

According to most research, second and third year teachers' produce larger student test score gains than first year teachers. Many assume this jump in effectiveness is due to on-the-job learning, and there is significant evidence that teachers' performance improves over time, mainly in their first few years in the classroom. However, some have posited that the apparent gains in teacher effectiveness are due to poorly performing teachers leaving the profession. Some research suggests that teachers with better credentials leave the profession sooner, but other evidence shows that novice teachers who exit quickly actually perform worse.

While this issue may seem esoteric, it actually has significant policy implications. If teachers' performance improves in their second and third years, we need to determine whether better teacher performance can be achieved more quickly through improved preparation practices prior to beginning teaching or better induction and mentoring from the moment novice teachers arrive at the school where they will teach. On the other hand, if ineffective teachers take a year or more to decide to leave or even longer to be removed as teachers, policies and practices should be developed to promote improved screening, recruitment, selection, identification, and removal procedures.

Understanding what is behind the significant increases in novice teachers' effectiveness requires that we decompose these improvements into two sources: the amount due to attrition and the amount due to the increasing effectiveness of the teachers who remain in the profession. In this policy brief, we decompose the effects of attrition and of increases in teachers' effectiveness for North Carolina public school teachers with less than five years experience. Teachers included in the study were employed between 2004-05 and 2008-09 for grades 6-12 and between 2005-06 and 2008-09 for grades 3-5. To enable analysis, we placed each novice teacher into one of five persistence categories: stay for at least five years of teaching, or leave after one, two, three, or four years of teaching. In addition, our sample only includes teachers who could have been observed for at least their first five years as teachers if they had stayed in NC public school classrooms. Finally, we used data that linked students to their teachers for each subject or course and combined those files with administrative data on the teachers and data on students' individual characteristics, including prior test scores, classroom characteristics, and school characteristics. This allowed us to estimate the extent to which teachers were more or less effective than others with similar students, classes, and schools (*see Henry, Bastian, and Fortner, 2011 for additional details on the data and methods*).

Figure 1: Teacher Development Trajectories in Elementary Grades Math and Reading



NOTES: In both mathematics and reading, teachers who stay at least two years make statistically significant gains in effectiveness between their first and second years of teaching. In both mathematics and reading, teachers who stay at least five years do not exhibit significant improvements between their third and fifth years of teaching. In reading, teachers who leave after four years are significantly less effective in their final year of teaching than in their second year. In both mathematics and reading, teachers who leave after four years are significantly less effective in their final year than those who stay five teachers in their fourth year.

Are teachers who leave the classroom less effective?

As we show in Figures 1-3, across teachers' first five years of teaching, those who leave the profession in NC are generally less effective than those who stay. First year teachers who exit the profession are less effective than those who stay longer in high school and middle school reading. In addition, teachers who leave after three or four years are less effective in their final year of teaching than they were in earlier years. This drop in performance may be due to teachers reducing their effort in their last year on the job, due to having been pushed out for performance concerns prior to earning tenure, or due to burn-out. Regardless, these results indicate that conventional estimates of novice teachers' effectiveness overstate the effects of on-the-job development. So how much do teachers develop in terms of effectiveness during their first five years?

How much does teachers' effectiveness develop during their first five years on the job?

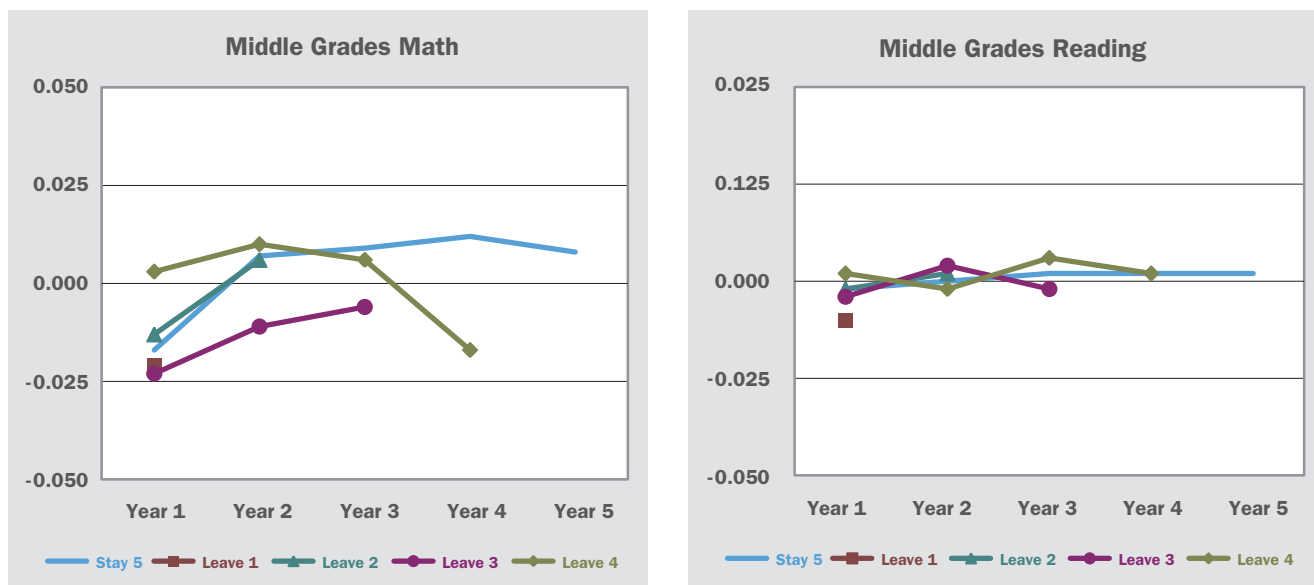
Teachers' effectiveness in the classroom improves substantially between their first and second years on the job for four of the five groups of teachers that we examined in this study. In elementary reading and mathematics, middle school mathematics, and all high school subjects, teachers

are much more effective in their second year. Only middle school reading teachers do not appear to develop on the job during their first year. Moreover, teachers' effectiveness does not improve significantly after three years on the job in any of the five comparisons. The pattern of increases in effectiveness for high school teachers perhaps best illustrates these trends: rapid on-the-job development followed by a flattening of performance. From these results, we conclude that many novice teachers have the capacity for immediate improvement if their preparation, orientation, induction, and mentoring could stimulate their development as effective teachers.

Are gains from teachers' development on the job larger or smaller than the effects of less effective teachers leaving?

As Table 1.1 illustrates, despite the fact that less effective teachers exit NC public schools, most of the traditional estimates of differences in average effectiveness of first, second, and third year teachers are attributable to on-the-job learning, rather than to the attrition of less effective teachers. However, this effect differs across grade levels and subjects. In elementary grades mathematics and reading, middle grades mathematics, and all high school subjects, teachers' on-the-job development accounts for approximately 80 percent or more of the teacher

Figure 2: Teacher Development Trajectories in Middle Grades Math and Reading



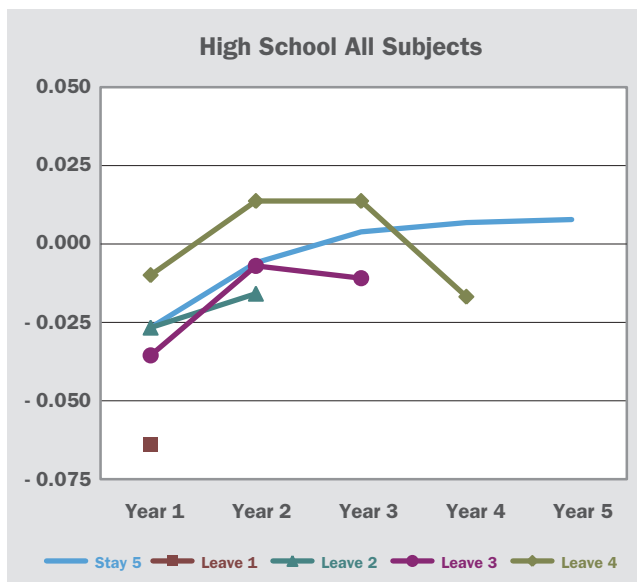
NOTES: In mathematics, teachers who stay at least two years make statistically significant gains in effectiveness between their first and second years of teaching. In reading, teachers do not make statistically significant gains in effectiveness between their first and second year of teaching. In reading, teachers who leave after one year are significantly less effective than other first year teachers who will return. In both mathematics and reading, teachers who stay at least five years do not exhibit significant improvements between their third and fifth years of teaching. In mathematics, teachers who leave after three or four years are significantly less effective in their final year than stay five teachers with comparable experience.

experience effect. Middle grades reading is an exception. The learning gains for early career teachers are smaller in this area than in other subjects, and those who exit after one year are significantly less effective than those who remain. Only 57 percent of the differences in average effectiveness of first and second year teachers are attributable to teachers' development. Nonetheless, the partitioning of these differences in average teacher effectiveness shows that teachers' on-the-job learning is substantial. Even after accounting for differential attrition, teachers are much more effective after a single year of experience. First and second year teachers have the capacity for considerable development; accelerating teachers' development should be an objective for improving student achievement.

Which teachers leave the field quickly?

Finally, understanding the characteristics of novice teachers who leave teaching, and the classroom and school environments in which they work, could help identify in advance teachers who are likely to leave, focus recruitment on those likely to stay, and provide additional support to those in difficult working conditions. Tables 1.2 to 1.4 display two clear trends at the elementary, middle, and high school levels. First, certain groups of teachers leave the profession more quickly, causing a churn of teachers that

Figure 3: Teacher Development Trajectories in High School



NOTES: Teachers who stay at least two years make statistically significant gains in effectiveness between their first and second years of teaching. Teachers who leave after one year are significantly less effective than the first year teachers who return. Teachers who stay at least five years do not exhibit significant improvements between their third and fifth years of teaching. Teachers who leave after four years are significantly less effective in their final year of teaching than in their third year. Teachers who leave after four years are significantly less effective in their final year than stay five teachers in their fourth year.

Table 1.1: Partitioning Returns to Experience

Grade Level/Subject	Percentage of First Year Teachers that Exit NCPS	Percentage of Returns to Experience Attributable to Teacher Learning	Percentage of Returns to Experience Attributable to Differential Attrition
Elementary School Mathematics	11.05%	92.29%	7.71%
Elementary School Reading	11.05%	88.14%	11.86%
Middle School Mathematics	17.84%	83.53%	16.47%
Middle School Reading	15.96%	57.40%	42.60%
High School All Subjects	15.88%	78.96%	21.04%

increases the number of beginning teachers in the state. In elementary school, teachers prepared out-of-state who come to North Carolina to begin their teaching careers comprise a large percentage of the teaching workforce and leave at disproportionately high rates. The same is true for alternative entry teachers in both middle and high school. This turnover does not indicate that these teachers are less effective. In fact certain groups of alternative entry teachers, such as Teach For America corps members, are much more effective at the middle and high school levels. But it does signal a need to simultaneously consider both teacher effectiveness and teacher retention patterns to focus recruitment on prospective teachers who are likely to be effective and will remain in classrooms in North Carolina.

Second, across elementary, middle, and high school it is clear that those teachers who ended up leaving early were

assigned to classrooms with lower-performing, higher poverty, and more minority students. Furthermore, for elementary and middle school teachers, the teachers who ended up leaving early were serving in schools with higher proportions of lower-performing, higher poverty, and minority students. Quite simply, those who exit teaching quickly appear to be disproportionately placed in more challenging environments. It is not clear, whether these early exiting teachers are of a lower quality, thus getting matched to more difficult, high-need assignments, or whether poor working conditions contribute both to their inefficacy and exit. Therefore, in these high-need classrooms and schools, greater teacher supports are needed to improve teachers' effectiveness, and/or more thoughtful hiring and assignment patterns are necessary to improve teacher retention, teacher effectiveness, and student performance.

Table 1.2: Characteristics of Novice Elementary School Teachers

Grade Level/Subject	Leave After 1	Leave After 2	Leave After 3	Leave After 4	Stay For 5
Teacher Variables					
Percentage In-State Prepared	27.16%	22.89%	29.34%	36.08%	45.86%
Percentage Out-of-State Prepared	48.55%	49.49%	42.30%	47.88%	35.25%
Praxis II Standardized Test Scores	0.210 (0.655)	0.284 (0.698)	0.200 (0.665)	0.221 (0.638)	0.207 (0.631)
Classroom Variables					
Prior Year Class Average	-0.201 (0.430)	-0.172 (0.470)	-0.196 (0.585)	-0.096 (0.505)	-0.097 (0.512)
Classroom Free and Reduce Price Lunch Percentage	57.14 (26.90)	60.19 (27.94)	47.99 (32.55)	44.49 (30.66)	44.30 (30.85)
Classroom Minority Student Percentage	62.56 (30.52)	58.71 (30.32)	54.27 (32.19)	44.13 (31.45)	45.90 (31.48)
School Variables					
School Performance Composite	0.574 (0.146)	0.584 (0.151)	0.581 (0.168)	0.610 (0.159)	0.601 (0.159)
School Free and Reduced Price Lunch Percentage	60.35 (24.95)	61.29 (23.99)	58.42 (25.80)	53.94 (24.57)	55.78 (24.84)
School Minority Student Percentage	58.13 (26.94)	57.41 (25.96)	54.50 (27.41)	48.80 (27.15)	48.14 (27.58)

Table 1.3: Characteristics of Novice Middle School Teachers

Grade Level/Subject	Leave After 1	Leave After 2	Leave After 3	Leave After 4	Stay For 5
Teacher Variables					
Percentage Alternative Entry	56.80%	61.45%	60.35%	40.30%	39.97%
Percentage In-State Prepared	13.61%	13.25%	13.64%	26.27%	29.88%
Percentage Out-of-State Prepared	28.40%	23.69%	25.25%	30.15%	26.01%
Praxis II Standardized Test Scores	0.065 (0.788)	0.235 (0.837)	0.012 (0.909)	0.180 (0.813)	0.099 (0.767)
Classroom Variables					
Prior Year Class Average	-0.447 (0.752)	-0.395 (0.799)	-0.321 (0.756)	-0.208 (0.796)	-0.232 (0.777)
Classroom Free and Reduce Price Lunch Percentage	62.28 (29.02)	59.27 (29.25)	55.13 (29.37)	49.67 (30.23)	49.70 (29.98)
Classroom Minority Student Percentage	62.78 (31.44)	65.51 (32.30)	61.94 (31.83)	53.34 (32.82)	52.00 (33.46)
School Variables					
School Performance Composite	0.512 (0.165)	0.511 (0.179)	0.527 (0.168)	0.572 (0.173)	0.567 (0.167)
School Free and Reduced Price Lunch Percentage	59.68 (21.85)	60.16 (23.11)	56.42 (22.78)	50.64 (22.25)	51.97 (21.02)
School Minority Student Percentage	57.09 (24.53)	62.97 (26.12)	57.51 (25.64)	49.24 (24.90)	48.25 (26.23)

Table 1.4: Characteristics of Novice High School Teachers

Grade Level/Subject	Leave After 1	Leave After 2	Leave After 3	Leave After 4	Stay For 5
Teacher Variables					
Percentage Alternative Entry	54.30%	58.42%	57.07%	40.00%	37.62%
Percentage In-State Prepared	24.19%	19.93%	21.87%	33.75%	36.88%
Percentage Out-of-State Prepared	20.43%	19.93%	18.67%	22.50%	21.83%
Praxis II Standardized Test Scores	0.163 (0.905)	0.200 (8.05)	0.152 (0.762)	0.318 (0.704)	0.226 (0.689)
Classroom Variables					
8th Grade Test Score Class Average	-0.204 (0.542)	-0.189 (0.616)	-0.105 (0.606)	-0.055 (0.639)	-0.040 (0.641)
Classroom Free and Reduce Price Lunch Percentage	41.49 (27.74)	41.15 (25.47)	37.17 (24.74)	34.36 (24.69)	33.89 (24.44)
Classroom Minority Student Percentage	49.54 (31.57)	56.05 (30.61)	50.39 (31.34)	46.89 (30.63)	43.15 (30.20)
School Variables					
School Performance Composite	0.666 (0.145)	0.626 (0.163)	0.645 (0.165)	0.664 (0.148)	0.683 (0.144)
School Free and Reduced Price Lunch Percentage	39.26 (19.32)	42.84 (21.26)	42.71 (21.44)	38.23 (19.20)	38.48 (19.01)
School Minority Student Percentage	46.19 (23.72)	55.15 (27.02)	49.64 (27.61)	46.19 (24.97)	42.77 (25.07)

Discussion

Our research indicates two important trends. First, less effective educators are more likely to exit the profession in North Carolina, especially after their first or fourth year of teaching. This means that prior research has over-estimated returns to experience. Second, teachers have a great capacity for early career development. Teachers make the most gains in effectiveness between their first and second years of teaching, with a large majority of returns to experience attributable to on-the-job learning. Taken together, these findings indicate that recommendations to adopt teacher quality policies to identify ineffective teachers and remove them from the profession may not be as valuable as policies and practices directed toward improving teacher preparation through more effective and/or extended student teaching, meaningful mentoring, and comprehensive induction experiences. Other policies that could be effective in improving student achievement could focus on improving recruitment and assignment of novice teachers. In this report we begin to provide some characteristics that are related to early exit from the North Carolina teacher workforce, such as teachers who are prepared out-of-state and alternative entry teachers. We also show that novice teachers tend to exit the NC teacher workforce from high-needs schools. Identifying prospective teachers with a greater commitment to teaching and improving student performance in North Carolina may improve retention and test score gains. In addition, education administrators may need to look

at policy options for having more experienced teachers assigned to these types of schools and targeting resources toward better induction and improved mentoring for novice teachers, who are needed in these types of schools to enhance both effectiveness and retention. Overall, these types of policies have the potential to substantially improve early-career teacher performance, and, therefore, they should be developed, piloted, and rigorously evaluated as a part of the effort to improve student achievement.

For more research on this topic

Clotfelter, C.T., Ladd, H.F., & Vigdor, J.L. (2007). Teacher credentials and student achievement: Longitudinal analysis with student fixed effects. *Economics of Education Review*, 26(6), 673-682.

Goldhaber, D., Gross, B., & Player, D. (2011). Teacher career paths, teacher quality, and persistence in the classroom: Are public schools keeping their best? *Journal of Policy Analysis and Management*, 30(1), 57-87.

Henry, G.T., Bastian, K.C., & Fortner, C.K. (2011). Stayers and leavers: Early-career teacher effectiveness and attrition. In review, *Educational Researcher*.

Staiger, D.O., & Rockoff, J.E. (2010). Searching for effective teachers with imperfect information. *Journal of Economic Perspectives*, 24(3), 97-118.

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